Listing of claims

1. (canceled)

2. (currently amended) The [[An]] array composition according to claim [[1]]52, 55 or 57, wherein at least one of said subpopulations comprises a unique optical signature.

3. (currently amended) The [[An]] array composition according to claim [[1]] 52, 55 or 57, wherein each subpopulation comprises an identifier binding ligand that will bind a decoder binding ligand for identification and elucidation of said bioactive agent.

4. (currently amended) The [[An]] array composition according to claim [[1]]52, 55 or 57, wherein said substrate is a fiber optic bundle and said fiducial is a fiducial fiber.

5. (currently amended) The [[An]] array composition according to claim [[1]] 4 wherein said substrate is a fiber optic bundle, said array comprises at least three non-linear fiducials, and each of said fiducials is a fiducial fiber.

6. (currently amended) The [[An]] array composition according to claim 5 wherein at least one of said fiducial fibers has a different shape from the others.

7. (canceled)

8. (canceled)

9. (currently amended) The [[An]] array composition according to claim [[1]]52, 55 or 57, wherein said bioactive agents are nucleic acids.

10. (currently amended) The [[An]] array composition according to claim [[1]]52, 55 or 57, wherein said bioactive agents are proteins.

11. (currently amended) The [[An]] array composition according to claim [[1]] 52, 55 or 57, further comprising a computer readable memory comprising:

a) computer code that receives a first data image; and

b) computer code that registers said first data image using said fiducial to generate a first registered data image.

12. (currently amended) The [[An]] array composition according to claim 11 wherein said computer readable memory further comprises:

a) computer code that receives a second data image;

b) computer code that registers said second data image using said fiducial to generate a second registered data image; and

c) computer code that compares said first and said second data image.

13. (withdrawn) A composition comprising a computer readable memory to direct a computer to function in a specified manner, said computer readable memory comprising:

a) an acquisition module for receiving a data image of a random array comprising a plurality of discrete sites;

b) a registration module for registering a data image; and

c) a comparison module for comparing registered data images.

14. (withdrawn) A composition according to claim 13 wherein said random array comprises a fiber optic bundle and said registration module utilizes a fiducial fiber for registration.

15. (withdrawn) A composition according to claim 13 wherein said random array comprises microspheres and said registration module utilizes a fiducial microsphere for registration.

16. (withdrawn) A composition according to claim 13 wherein said registration module utilizes a fiducial template for registration.

17. (withdrawn) A composition according to claim 13 further comprising a random array comprising:

a) a substrate with a surface comprising discrete sites; and

b) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises a bioactive agent;

wherein said microspheres are distributed on said surface.

18. (canceled)

19. (currently amended) The [[A]] method according to claim [[18]] 60, 63 or 65, wherein said subpopulations further comprise an identifier binding ligand that will bind a decoder binding ligand for identification and elucidation of the bioactive agent.

20. (currently amended) The [[A]] method according to claim [[18]]60, 63 or 65, wherein at least one of said subpopulations further comprise an optical signature for identification and elucidation of the bioactive agent.

21. (currently amended) The [[A]] method according to claim [[18]] 60, 63 or 65, wherein said substrate is a fiber optic bundle and said fiducial is a fiducial fiber.

22. (currently amended) The [[A]] method according to claim [[18]] 21, wherein said substrate is a fiber optic bundle, said array comprises at least three non-linear fiducials, and each of said fiducials is a fiducial fiber.

23. (currently amended) The [[A]] method according to claim 22 wherein at least one of said fiducial fibers has a different shape from the others.

24. (canceled)

25. (canceled)

26. (currently amended) The [[A]] method according to claim [[18]] 60, 63 or 65, wherein said bioactive agents are nucleic acids.

27. (currently amended) The [[A]] method according to claim [[18]] 60, 63 or 65, wherein said bioactive agents are proteins.

28. (withdrawn) A method for comparing separate data images of a random array comprising:

a) using a computer system to register a first data image of said random array to produce a registered first data image;

b) using said computer system to register a second data image of said random array to produce a registered second data image; and

c) comparing said first and said second registered data image to determine any differences between them.

29. (withdrawn) A method according to claim 28 wherein said random array comprises a fiber optic bundle and the registration of said first data image utilizes a fiducial fiber.

30. (withdrawn) A method according to claim 28 wherein said random array comprises microspheres and the registration of said first data image utilizes a fiducial microsphere.

31. (withdrawn) A method according to claim 28 wherein the registration of said first data image utilizes a fiducial template.

32. (withdrawn) A method of decoding a random array composition comprising

a) providing a random array composition comprising:

i) a substrate with a surface comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises a bioactive agent;

wherein said microspheres are distributed on said surface;

b) adding a first plurality of decoding binding ligands to said array composition and creating a first data image;

c) using a fiducial to generate a first registered data image;

d) adding a second plurality of decoding binding ligands to said array composition and creating a second data image;

e) using said fiducial to generate a second registered data image; and

f) using a computer system to compare said first and said second registered data image to identify the location of at least two bioactive agents.

33. (withdrawn) A method according to claim 32 wherein said random array comprises a fiber optic bundle and the registration of said first data image utilizes a fiducial fiber.

34. (withdrawn) A method according to claim 32 wherein said random array comprises microspheres and the registration of said first data image utilizes a fiducial microsphere.

35. (withdrawn) A method according to claim 32 wherein the registration of said first data image utilizes a fiducial template.

36. (withdrawn) A method according to claim 32 wherein said bioactive agents are proteins.

37. (withdrawn) A method according to claim 32 wherein said bioactive agents are nucleic acids.

38. (withdrawn) A method of determining the presence of a target analyte in a sample comprising:

a) acquiring a first data image of a random array composition comprising:

i) a substrate with a surface comprising discrete sites; and

ii) a population of microspheres comprising at least a first and a second subpopulation each comprising a bioactive agent;

wherein said microspheres are distributed on said surface such that said discrete sites contain microspheres;

b) registering said first data image to create a registered first data image;

c) contacting said random array composition with said sample;

d) acquiring a second data image from said array with said sample;

e) registering said second data image to create a registered second data image; and

f) comparing said first and said second registered data images to determine the presence or absence of said target analyte.

39. (withdrawn) A method according to claim 38 wherein said random array comprises a fiber optic bundle and the registration of said first data image utilizes a fiducial fiber.

40. (withdrawn) A method according to claim 38 wherein said random array comprises microspheres and the registration of said first data image utilizes a fiducial microsphere.

41. (withdrawn) A method according to claim 38 wherein the registration of said first data image utilizes a fiducial template.

42. (withdrawn) A method according to claim 38 wherein said bioactive agents are proteins.

43. (withdrawn) A method according to claim 38 wherein said bioactive agents are nucleic acids.

44. (currently amended) The [[A]] composition according to claim [[1]] 52, 55 or 57, wherein said discrete sites are wells.

45. (currently amended) The [[A]] composition according to claim [[1]] 52, 55 or 57, wherein said microspheres are randomly distributed on said substrate.

46. (currently amended) The [[A]] method according to claim [[18]] 60, 63 or 65, wherein said discrete sites are wells.

47. (currently amended) The [[A]] method according to claim [[18]] 60, 63 or 65, wherein said microspheres are randomly distributed on said substrate.

48. (currently amended) The [[A]] method according to claim 19, wherein said identifier binding ligand is a protein.

49. (currently amended) The [[A]] method according to claim 19, wherein identifier binding ligand is a nucleic acid.

50. (currently amended) The [[An]] array composition according to claim 3, wherein said identifier binding ligand is a protein.

51. (currently amended) The [[An]] array composition according to claim 3, wherein identifier binding ligand is a nucleic acid.

52. (new) An array composition comprising:

a) a substrate with a surface comprising discrete sites;

b) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises a bioactive agent, wherein said microspheres are distributed on said surface; and

c) at least one fiducial, wherein said fiducial is permanently incorporated into said substrate.

53. (new) The array composition according to claim 52, wherein said fiducial is on the periphery of said array.

54. (new) The array composition according to claim 53, wherein said fiducial is at a defined location of said array.

55. (new) An array composition comprising:

a) a substrate with a surface comprising discrete sites;

b) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises a bioactive agent, wherein said microspheres are distributed on said surface; and

c) at least one fiducial, wherein said fiducial is on the periphery of said array.

56. (new) The array composition according to claim 55, wherein said fiducial is at a defined location of said array.

57. (new) An array composition comprising:

a) a substrate with a surface comprising discrete sites;

b) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises a bioactive agent, wherein said microspheres are distributed on said surface; and

c) at least one fiducial, wherein said fiducial is at a defined location of said array.

58. (new) The array composition according to claim 57, wherein said fiducial is permanently incorporated into said substrate.

59. (new) The array composition according to claim 52, 55 or 57, wherein said substrate is a fiber optic bundle.

60. (new) A method of making an array composition comprising:

a) forming a surface comprising individual sites on a substrate;

b) distributing microspheres on said surface such that said individual sites contain microspheres, wherein said microspheres comprise at least a first and a second subpopulations each comprising a bioactive agent; and

c) permanently incorporating at least one fiducial onto said surface.

61. (new) The method according to claim 60, wherein said fiducial is on the periphery of said array.

62. (new) The method according to claim 61, wherein said fiducial is at a defined location of said array.

63. (new) A method of making an array composition comprising:

a) forming a surface comprising individual sites on a substrate;

b) distributing microspheres on said surface such that said individual sites contain microspheres, wherein said microspheres comprise at least a first and a second subpopulations each comprising a bioactive agent; and

c) incorporating at least one fiducial onto said surface, wherein said fiducial is on the periphery of said array.

64. (new) The method according to claim 63, wherein said fiducial is at a defined location of said array.

65. (new) A method of making an array composition comprising:

a) forming a surface comprising individual sites on a substrate;

b) distributing microspheres on said surface such that said individual sites contain microspheres, wherein said microspheres comprise at least a first and a second subpopulations each comprising a bioactive agent; and

c) incorporating at least one fiducial onto said surface, wherein said fiducial is at a defined location of said array.

66. (new) The method according to claim 64, wherein said fiducial is permanently incorporated into said array.

67. (new) The method according to claim 60, 63 or 65, wherein said substrate is a fiber optic bundle.